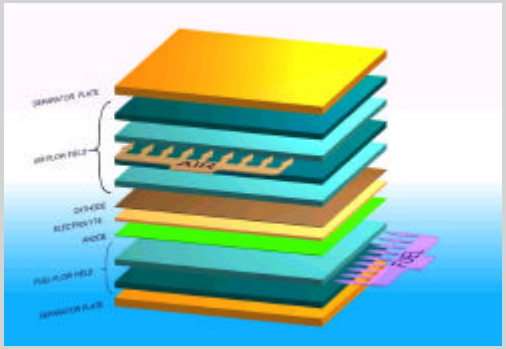
Affordable Multilayer Ceramic Fuel Cell Power Plant Systems (AMPS)



Multi-layer Ceramic Fuel Cells

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Tom J. George (Project Manager), NETL

CONTRACT, DE-AC26-99FT40691

Awarded 10/1/00, 40 Month Duration

$17,976,459 ($8,902,305 DOE)

Goals and Objectives
MTI FUEL CELL PROGRAM

- **Objective: Develop high-performance multi-layer solid oxide fuel cell using low-cost MLC manufacturing methods**
- **Long-term Goals:**
  - **Area specific resistance (ASR) < 0.5 ohm-cm^2**
  - **Degradation < 0.25%/1000 hours**
  - **Manufacturing cost < $300/kW (for stack)**

Goals & Objectives Detailed

TASK	YEAR 1				YEAR 2				YEAR 3				YEAR 4		MILESTONE/DECISION POINT DESCRIPTION
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	
PHASE I	**Phase I started 10/1/00**														
TASK 1.1															
TASK 1.2															
TASK 1.3															ELS cells demonstrated
TASK 2.1															
TASK 2.2															
TASK 2.3															Filled-via interconnects demonstration
TASK 2.4															
TASK 3															Analytical models developed for PSOFC
TASK 4															PSOFC manufacturing cost model established
TASK 5															Competitive PSOFC configuration(s) and manufacturing processes selected
TASK 6															
PHASE II															
TASK 7															NEPA report completed
TASK 8															PSOFC short stack design established
TASK 9															Co-fired PSOFC short stack demonstrated
TASK 10															Test plan completed
TASK 11															Short stacks successfully fabricated
TASK 12															
PHASE III															
TASK 13															NEPA report completed
TASK 14															PSOFC performance and quality demonstrated
TASK 15															Business plan prepared
TASK 16															

▼ Milestone ◆ Decision Point

Descriptor - include initials, /org#/date

Schedule, Milestones and Go/No Go Decision Points

Accomplishments

- NEPA completed.
- Management plan submitted.
- First Design Set
- Pilot Manufacturing Line Constructed

Ongoing Activities

- Design refinement.
- Cell-stack co-firing tests.
- Component Manufacture.

Planned Activities, FY01/02

- Co-fire stack of cells.
- Test stack.

Budget requirements

- **FY'00, $1791K**
- **FY'01, $3418K (+$1555K requested)**
- **FY'02, $3693K**

Issues/Concerns

- **Must reduce cell/stack cost.**

Next Slides From MTI Presentation Materials

AMPS Program

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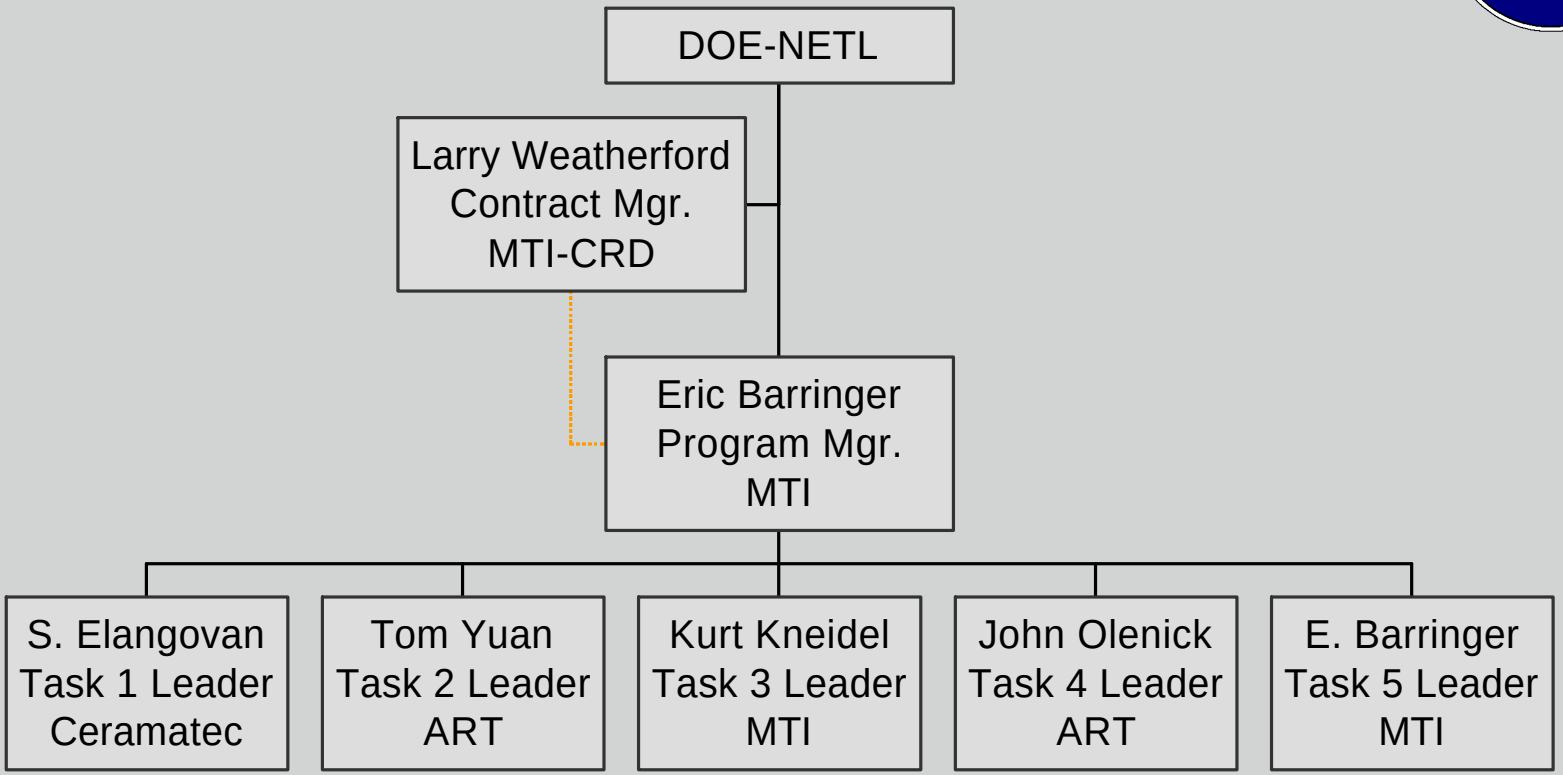
AMPS Team

- **McDermott Technology, Inc. (MTI)**
  - **Multi-layer SOFC design and modeling**
  - **Materials characterization/testing support**
  - **Electrochemical testing (stacks)**
- **Ceramatec**
  - **SOFC materials technology**
  - **ELS cell development**
  - **Electrochemical testing (cells)**
- **Advanced Refractory Technologies (ART)**
  - **Multi-layer interconnect development**
  - **MLC manufacturing process development**

AMPS Program Organization



AMPS Concept